REMARKS

Favorable reconsideration of the above-identified application is requested in view of the amendments made herein and the following remarks.

The specification is amended to correct a minor typographical error.

Claims 22-25 are newly added. Thus, Claims 1-5 and 7-25 are pending, with Claims 1, 7, 11-13 being independent. The Examiner is thanked for indicating that Claims 2-5, 10, 14, and 16-19 would be allowable if rewritten in independent form.

Claim 1 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kawai et al.* (U.S. Patent No. 6,449,060), hereinafter *Kawai*, in view of *Koichi* (Japanese Publication Number 09-298665), hereinafter *Koichi*. Claims 7-9, 11, 12, 20 and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kawai*. Claims 13 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hiratsuka et al.* (U.S. Patent No. 4,980,760), hereinafter *Hiratsuka*.

The Background section of the present application discusses reading of an image with a CCD sensor having three element arrays of Red, Green and Blue. The element arrays are arranged in parallel with each other at a predetermined distance d in the secondary scanning direction. When detecting an image, a time based shift occurs among the image data of Red, Green and Blue because of a position shift between the element arrays of Red, Green and Blue in the secondary scanning direction. The secondary scanning direction is the direction in which an original image and the CCD sensor move relative to each other. In a simplified sense, the Red in the image is detected first, then the Green, and then the Blue, as the image is swept across the three element arrays of the sensor. Thus, each color of the image is out of phase with the other by a distance d between the respective element arrays.

To address the phase shift among Red, Green and Blue colors, the phase of the Red, Green and Blue image output data are adjusted so that they are of the same phase. However, when an image is reduced or enlarged, and the scanning speed is correspondingly changed, the phase shift among the Red, Green and Blue may not be an integral multiple (e.g., 2d, 3d, etc.) of a line. To address that issue, the phase shift among Red, Green and Blue is corrected as precisely as possible by an interpolation process. In one process, the density of each color of the position is determined as a weighted average of the densities of the lines.

However, when this interpolation process is performed on a Black Fine Line, e.g., a line that is one pixel thick, the reproducibility of the Black Fine Line is deteriorated by the fractional correction interpolation process. For example, the Black Fine Line tends to become greenish or reddish.

One method addressing that issue determines if the portion operated on is achromatic or chromatic, i.e., if the line (or a letter) is black or colored. Basically, if it can be determined that a line is achromatic, any resulting color can be eliminated. Such is often accomplished by evaluating the difference between a maximum and minimum chroma value in subject data. However, significant issues arise because of chromatic aberrations that produce colors on the edges of achromatic (e.g., black) objects, thereby leading to falsely detecting chromatic objects and corresponding incorrect correction. Essentially, it is hard to determine if a Black Thin Line is chromatic or achromatic because of chromatic aberrations.

The present application discusses a solution to the above-noted dilemma and describes an image processing apparatus having a first sensor that has a plurality of reading elements that are arranged in a primary scanning direction. A second

sensor has a plurality of reading elements that are arranged in the primary scanning direction, the second sensor being disposed a predetermined number of lines apart from the first sensor in a secondary scanning direction. There is an integral correction portion for correcting a data output time difference due to a position difference between the first and the second sensors by an amount corresponding to an integral number of line units. A fractional correction portion corrects the data output time difference due to a position difference between the first and the second sensors by an amount corresponding to less than one line unit. A black fine line detection portion detects a black fine line included in image data, and the fractional correction portion is disabled if the black fine line has been detected by the black fine line detection portion. That subject matter is defined in Claim 1, as amended, of the present application.

Figures 5a-5d illustrate example results corresponding to the above-noted situations. However, before explaining Figures 5a-5d, it is important to understand the context of the scaling ratio and interpolation coefficient α in the present application. The scaling ratio is the magnification of the original image. For example, an image that is magnified to twice its original size, has a scaling ratio of 2. Or, an image that is reduced to .6 times its original size has a scaling ratio of .6. The interpolation coefficient is a remainder, or partial width d of a line space between element arrays, after the scaling ratio is applied. For example, if the Red and Green element arrays are spaced apart by 4 lines, and the scaling ratio is .6, the resulting distance is 2.4, and the interpolation coefficient (remainder) α is .4.

Given that understanding, we now turn attention to correction results for a Black Fine Line shown in Figures 5a-5d. Figure 5a shows the Red, Green and Blue

signal before any correction, *i.e.*, when the signals are out of phase by the respective

distances d. Figure 5b shows the positions (phases) and densities of the Red,

Green and Blue image data after correction when the scaling ratio is 1, *i.e.*, when the

interpolation coefficient α is zero. The phases are easily aligned and the weighted

densities of the colors Red, Green and Blue are not affected by the interpolation with

the interpolation coefficient α.

However, Figure 5c shows a case where the interpolation coefficient α is not

zero, and the densities of the colors Red and Blue are decreased, become out of

balance, and deteriorate the reproducibility of Black Fine Lines. To address that

problem, as shown in Figure 5d, the fractional interpolation is not performed for a

Black Fine Line, *i.e.*, the fractional correction portion is disabled. When only integral

correction is performed on a Black Fine Line, *i.e.*, the fractional correction does not

take place, results are better.

Thus, as described in the present application, it is necessary to detect a Black

Fine Line and to disable the interpolation process for the fractional portion when a

Black Fine Line is detected.

The Examiner proposes that it would have been obvious to combine *Kawai*

and *Koichi* to make obvious the combination of features recited in Claim 1, including

the subject matter relating to the fractional correction portion. Specifically, the

Examiner believes that *Kawai* discloses all the features of Claim 1, except the

operation of disabling a correction (the fractional correction portion) based on

detection of the black fine line.

Kawai is concerned with image correction, and particularly, applying certain

image correction to chromatic image data while not applying certain image correction

to achromatic image data. For example, the Summary of the Invention section of *Kawai*, column 3, lines 61-63, states that an object of the invention is to provide an image processing apparatus and method, which can accurately discriminate if an input image is a color or monochrome image. Also, column 4, lines 1-2 states that another object is to determine an achromatic color/chromatic color of each pixel with high precision. Specifically, *Kawai* discloses a achromatic color/chromatic color determination unit 115 that determines if the pixel of interest is a monochrome pixel (achromatic color) or a color pixel (chromatic color). See column 9, lines 21-25.

Koichi discloses an image processor that addresses the issue of redundant light in a reflected light. When a thin line on a paper is read, light is projected onto the paper and then received by a sensor. When the line on the paper is thin, the redundant reflected light (Figure 12 in *Koichi*) becomes an issue. Thus, *Koichi* discloses that density correction is controlled based on the line width. Specifically, page 10, lines 7-12 of the translation states that a fine line density conversion portion 23 determines a correction quantity depending on density and a line width of a fine line portion to output the corrected value. When the detection result is a non-fine line area, the fine line density conversion portion 23 outputs the input signal <u>without change</u>. In simple terms, if the line is a fine line, the density is converted by the fine line conversion portion 23, and when the line is not a fine line, the density is not converted. Essentially, based on the fine line determination, the density conversion is turned on/off.

Applicants believe that Claim 1 should be allowed at least because *Kawai* does not disclose a fractional correction portion. Also, even if *Kawai* did, in view of *Koichi*, a person of ordinary skill in the art would not have been directed to

enable/disable a fractional correction portion based on the presence of a Black Fine Line.

Applicants first turn to the issue of the Examiner's rejection based on the assertion that *Kawai* discloses a fractional correction portion. As noted above, the present application gives a rather succinct description of an embodiment of an exemplary fractional correction portion, and its function. That is, because a Red element array, Green element array and Blue element array are separated by a distance, a phase shift exists between the image data produced by each. Thus, the image data signals must be corrected by a phase corresponding to that distance. However, when an image is enlarged/reduced, that distance could have a fractional remainder, *e.g.*, .4. In that case, the disclosed embodiment includes a fractional correction portion that uses an interpolation coefficient and weighted densities of the fractional portions to make the correction for the fractional portion. However, the present invention is not limited to the disclosed embodiments.

The Examiner identifies several lengthy portions of *Kawai*, without specifically identifying what parts of *Kawai* correspond to a fractional correction portion or perform similar functions. Such broad citations make it difficult to understand what portions of *Kawai* the Examiner alleges correspond to the claimed fractional correction portion. Furthermore, Applicants have carefully examined *Kawai* and have not been able to find any disclosure in *Kawai* that seems to either be, or accomplish the same function as, the claimed fractional correction portion. Thus, Applicant believe that none exist.

Applicants remind the Examiner that according to 37 C.F.R. § 1.104(c)(2) (emphasis added), "*[i]n rejecting claims for want of novelty or for obviousness,*

the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, *the particular part relied on must be designated as nearly as practicable*. The pertinence of each reference, if not apparent, *must be clearly explained* and each rejected claim specified." Here, it is not apparent what part of *Kawai* is being relied upon for a disclosure of a fractional correction portion. Thus, as required by the federal rules, Applicants request that the Examiner point out the particular part of *Kawai* that is being relied upon for a disclosure of a fractional correction portion, or that the rejection based on *Kawai* be withdrawn. The Examiner is also reminded that due to the failure to meet the standards set forth in the rules, that the present rejection has not established a *prima facie* case of obviousness and that if a new rejection is set forth, it would be appropriate for it to be non-final.

Also, even if *Kawai* did disclose a fractional correction portion, *Koichi* would not provide a person skilled in the art any direction or motivation to disable such based on an output of a fine line detection portion because neither *Kawai* nor *Koichi* disclose a fractional correction portion.

For at least the reasons stated above, the rejection of Claim 1 should be withdrawn.

Claims 7-9, 11, 12, 20 and 21 are rejected as being unpatentable over *Kawai*, Claims 7, 11 and 12 being independent.

Claim 7 is directed to an image processing apparatus. A sensor is disposed linearly in a primary scanning direction and reads an image that has been decomposed into plural colors. An optical system projects light from the image onto the sensor. A correction portion corrects a misregistration of the colors in the

primary scanning direction that is due to a chromatic aberration of the optical system, the correction portion performing a misregistration correction for each of the plural areas divided in the primary scanning direction.

As with Claim 1, embodiments of the subject matter recited in Claim 7 is specifically illustrated and described in the specification. For example, with regard to the areas that are divided in the primary scanning direction, that idea is illustrated in Figures 20 and 21 of the present application, where AR1-AR4 refer to embodiments of the areas in question.

Again, the Examiner did not specifically identify the part of *Kawai* that corresponds to the feature of performing a misregistration correction for each of the plural areas. Rather, the Examiner merely directed attention to some relatively lengthy portions of *Kawai* and alleged that the claimed feature was contained therein. In the interest of brevity, Applicants merely remind the Examiner of 37 C.F.R. § 104(C) (2) that was discussed above in connection with Claim 1. Nonetheless, Applicants have carefully reviewed *Kawai* and have not discovered any disclosure of performing a misrecognition correction for each of a plurality of areas that are divided in the primary scanning direction.

For at least those reasons, the rejection of Claim 7 should be withdrawn.

Claims 8 and 9 are allowable at least by virtue of their dependence from allowable independent Claim 7.

Claim 11 is directed to an image processing apparatus. That image processing apparatus includes, among other features, a plurality of interline correction portions. An embodiment of the claimed interline correction portion is shown in the present application as part 15. Page 11, lines 11-16 in the present

application describes that the interline correction portion 15 is a circuit that corrects a phase shift of the image signal (image data) due to a misregistration of red, green and blue lines of the CCD sensor 12. The interline correction portion 15 performs the correction by delaying the red and green image data using field memories. On page 29, line 20 *et seq.*, a plurality of interline correction circuits are disclosed. See also Figure 12.

The Examiner has not specifically identified a portion of *Kawai* that corresponds to an interline correction portion, much less, a plurality of interline correction portions. Applicants submit that the Examiner has not met the burden established in 37 C.F.R. § 104(C) (2) that was discussed above. Applicants also believe that due to those burdens not being met, that a *prima facie* case has not been established. Nonetheless, Applicants have carefully reviewed *Kawai* and have not discovered any disclosure of a plurality of interline correction portions as recited in Claim 11 and Applicants believe that *Kawai* does not disclose that subject matter. For at least those reasons, the rejection of Claim 11 should be withdrawn. Should the Examiner maintain that a plurality of interline correction portions is disclosed in *Kawai*, it is requested that it is specifically shown where or how *Kawai* discloses such.

The rejections of Claims 20 and 21 should be withdrawn at least by virtue of their dependence from Claim 11.

Claim 12 recites, among other features, a combination of features that includes a plurality of interline correction portions. The rejection of Claim 12 should be withdrawn for similar reasons as Claim 11, with regard to similar claim language.

Claim 13 is rejected as being unpatentable over *Hiratsuka*.

Claim 13 is directed to a color image processing apparatus. Among other features, a fine line decision portion is for deciding whether the present pixel is on a fine line or not, for plural image data having different wavelength components read by an image reading device.

The Examiner states that the density converter 16 in *Hiratsuka* corresponds to and discloses the claimed fine line decision portion. However, upon review of the density converter 16 in *Hiratsuka*, Applicants believe that not to be the case. First of all, Claim 13 recites that the fine line decision portion decides whether the present pixel is on a fine line or not. Applicants did not find any indication in *Hiratsuka* relating to identification of a fine line. Also, column 3, lines 41-50 in *Hiratsuka* recites that: "The density converter 16 reduces a volume of data at the time of color correction in consideration of a human visual sense." Applicants believe that the reduction of volume of data performed by the density converter 16 is not the same as deciding whether a pixel is on a fine line or not, as performed by the claimed black fine line decision portion. Therefore, Applicants submit that the density converter 16 is not the same as the claimed fine line decision portion. Also, the Examiner proposes that the color ghost correction circuit 18 in *Hiratsuka* corresponds to and discloses the claimed density correction portion. However, Applicants point out that the color ghost correction is not the same as the claimed density correction, in combination with the other features recited in Claim 13. Should the rejection be maintained, it is requested that it be specifically explained how the density converter is understood by the Examiner to be a fine line decision portion that decides whether a pixel is on a fine line or not, and how the color ghost correction unit is the same as the density conversion portion in the context of Claim 13.

Claim 15 is allowable at least by virtue of its dependence from Claim 13.

For the reasons stated above, it is requested that all the rejections be withdrawn and that this application be allowed in a timely manner.

Should any questions arise in connection with this application, or should the Examiner feel that a teleconference would be helpful in resolving any remaining issues pertaining to this application, the undersigned requests that he be contacted at the number indicated below.

Respectfully submitted,

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Date: <u>October 5, 2006</u>   By: _____

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